CLAIMS

What is claimed is:

1. An apparatus for applying adhesive material to at least one semiconductor component, comprising:

an adhesive reservoir for providing an exposed surface of adhesive material to a defined portion of at least one semiconductor component positioned thereover, said adhesive reservoir comprising at least one pool chamber defined by at least one upward facing opening, said adhesive reservoir shaped such that the exposed surface of adhesive material is supplied to a precise location and said adhesive material having a surface tension; and

at least one mechanism associated with said adhesive reservoir, said at least one mechanism configured to level said exposed surface of adhesive material and maintain said exposed surface of adhesive material at a substantially constant level.

2. The apparatus of claim 1, wherein said exposed surface comprises a meniscus.

3. The apparatus of claim 1, wherein said at least one mechanism is configured to manipulate the surface tension of the adhesive material to flatten the exposed surface of said adhesive material.

4. The apparatus of claim 1, wherein said at least one mechanism is configured to manipulate the difference in pressure within said adhesive material and ambient air to be equal to twice the surface tension of said adhesive material divided by a radius of curvature of the adhesive material.

5. The apparatus of claim 1, wherein said at least one mechanism uses the surface tension of the adhesive material to control surface area and thickness of the adhesive material available for application to said at least one semiconductor component.

6. The apparatus of claim 1, wherein said at least one mechanism comprises at least one of a coating stencil, a pump and control system, a wiper, a vacuum, and a height detection mechanism.

7. The apparatus of claim 1, wherein said at least one mechanism comprises a coating stencil including:

a generally flat and generally horizontal top surface; and

a plurality of apertures aligned to wet said defined portion of said at least one semiconductor component with adhesive material, said plurality of apertures sized and configured to control extrusion of said adhesive material through said coating stencil to increase the exposed surface of said adhesive material.

8. The apparatus of claim 7, wherein said coating stencil is disposed over said at least one upward facing opening of said at least one pool chamber, such that the only access from within said at least one pool chamber through said at least one upward facing opening to above the adhesive reservoir is through said plurality of apertures of said coating stencil.

9. The apparatus of claim 7, wherein the plurality of apertures of said coating stencil are substantially rectangular in shape.

10. The apparatus of claim 7, wherein the plurality of apertures of said coating stencil are substantially square in shape.

11. The apparatus of claim 7, wherein the plurality of apertures of said coating stencil are positioned substantially parallel to each other and are spaced so as to have a centerline pitch between apertures of .020 inches (.051 cm).

12. The apparatus of claim 11, wherein the plurality of apertures of said coating stencil number 23 in quantity.

13. The apparatus of claim 7, wherein the plurality of apertures of said coating stencil are .260 inches (.660 cm) in length and are .010 inches (.025 cm) in width.

14. The apparatus of claim 7, wherein the plurality of apertures of said coating stencil are sized and configured as a result of considering adhesive material viscosity.

15. The apparatus of claim 14, wherein the plurality of apertures of said coating stencil are sized and configured to suit an adhesive material viscosity ranging from approximately 1000 to 500,000 centipoise.

16. The apparatus of claim 14, wherein the plurality of apertures of said coating stencil are sized and configured to optimally accommodate an adhesive material viscosity of approximately 62,000 centipoise.

17. The apparatus of claim 14, wherein the plurality of apertures of said coating stencil are sized and configured to optimally accommodate an adhesive material viscosity of approximately 62,000 centipoise at a temperature of approximately 77° F (25 °C).

18. The apparatus of claim 7, wherein the plurality of apertures of said coating stencil are arranged generally parallel to each other and are spaced so as to have a centerline pitch between apertures of .020 inches (.051 cm).

19. The apparatus of claim 18, wherein the plurality of apertures of said coating stencil number 23 in quantity.

20. The apparatus of claim 7, wherein the plurality of apertures of said coating stencil are .260 inches (.660 cm) in length and are .010 inches (.025 cm) in width.

21. The apparatus of claim 7, further comprising a vacuum on a bottom side of said coating stencil.

22. The apparatus of claim 1, further comprising at least one mechanism configured to bring said defined portion of at least one semiconductor component in contact with said exposed surface of adhesive material.

23. The apparatus of claim 1, wherein said adhesive reservoir further comprises an adhesive circulation mechanism configured to circulate said adhesive material and maintain uniformity of said adhesive material.

24. The apparatus of claim 1, wherein said at least one mechanism includes a pump configured to supply said adhesive material to said adhesive reservoir and a control system to control supply of said adhesive material to said adhesive reservoir so to control extrusion of adhesive material to a selectable height.

25. The apparatus of claim 1, wherein said at least one mechanism is attached to said adhesive reservoir.

26. The apparatus of claim 1, wherein said at least one semiconductor component comprises at least one lead finger on a lead frame.

27. An apparatus for applying viscous material to at least one semiconductor component, comprising:

a reservoir for providing an exposed surface of viscous material to at least a portion of at least one semiconductor component positioned thereover, said viscous reservoir comprising a at least one pool chamber in fluid communication with an viscous inflow chamber, said at least one pool chamber defined by at least one upward facing opening, said

reservoir shaped such that the exposed surface of viscous material is supplied to a precise location, and said viscous material having a surface tension;

at least one first mechanism configured to provide said viscous material to a desired selectable height above said pool chamber; and

at least one second mechanism associated with viscous reservoir, said at least one second mechanism configured to level said exposed surface of viscous material, to maintain said exposed surface of viscous material at a substantially constant level and to increase the effective exposed surface of viscous material.

28. The apparatus of claim 27, wherein said at least one first mechanism comprises:

a pump for supplying viscous material to said reservoir; and

a control system for controlling supply of the viscous material to said reservoir.

29. The apparatus of claim 27, wherein said exposed surface comprises a meniscus.

30. The apparatus of claim 27, wherein said at least one second mechanism is configured to manipulate surface tension of the viscous material to flatten out the exposed surface of said viscous material.

31. The apparatus of claim 27, wherein said at least one second mechanism is configured to manipulate the difference in pressure within said viscous material and ambient air to be equal to twice the surface tension of said viscous material divided by a radius of curvature of the viscous material.

32. The apparatus of claim 27, wherein said at least one second mechanism uses the surface tension of the viscous material to control surface area and thickness of the viscous material available for application to said at least one semiconductor component.

33. The apparatus of claim 27, wherein said at least one second mechanism comprises at least one of a coating stencil, a wiper, a vacuum, and a height detection mechanism.

34. The apparatus of claim 27, wherein said at least one mechanism comprises at least one coating stencil including:

a generally planar horizontal top surface; and

a plurality of openings positioned to wet said at least a portion of said at least one semiconductor component with viscous material, said plurality of openings sized and configured to control extrusion of said viscous material through said coating stencil to increase the exposed surface of said viscous material.

35. The apparatus of claim 34, wherein said at least one coating stencil is disposed over said at least one upward facing opening of said at least one pool chamber, such that the only access from within said at least one pool chamber through said at least one upward facing opening to above the reservoir is through said plurality of openings of said at least one coating stencil.

36. The apparatus of claim 34, wherein said plurality of openings of said at least one coating stencil are configured to apply said viscous material to only a selected portion of said at least one semiconductor component.

37. The apparatus of claim 34, wherein the plurality of openings of said at least one coating stencil are generally rectangular in shape.

38. The apparatus of claim 34, wherein the plurality of openings of said at least one coating stencil are generally square in shape.

39. The apparatus of claim 34, wherein the plurality of openings of said at least one coating stencil are positioned generally parallel to each other and are spaced so as to have a centerline pitch between openings of .020 inches (.051 cm).

40. The apparatus of claim 39, wherein the plurality of openings of said at least one coating stencil number 23 in quantity.

41. The apparatus of claim 34, wherein the plurality of openings of said at least one coating stencil are .260 inches (.660 cm) in length and are .010 inches (.025 cm) in width.

42. The apparatus of claim 34, wherein the plurality of openings of said at least one coating stencil are sized and configured as a result of considering viscous material viscosity.

43. The apparatus of claim 42, wherein the plurality of openings of said at least one coating stencil are sized and configured to manage a viscous material viscosity ranging from approximately 1000 to 500,000 centipoise.

44. The apparatus of claim 42, wherein the plurality of openings of said at least one coating stencil are sized and configured to optimally accommodate a viscous material viscosity of approximately 62,000 centipoise.

45. The apparatus of claim 42, wherein the plurality of openings of said at least one coating stencil are sized and configured to optimally accommodate a viscous material viscosity of approximately 62,000 centipoise at a temperature of approximately 77° F (25 °C).

46. The apparatus of claim 34, wherein the plurality of openings of said at least one coating stencil are arranged generally parallel to each other and are spaced so as to have a centerline pitch between openings of .020 inches (.051 cm).

47. The apparatus of claim 46, wherein the plurality of openings of said at least one coating stencil number 23 in quantity.

48. The apparatus of claim 34, wherein the plurality of openings of said at least one coating stencil are .260 inches (.660 cm) in length and are .010 inches (.025 cm) in width.

49. The apparatus of claim 34, wherein said at least one mechanism comprises a vacuum on a bottom side of said at least one coating stencil.

50. The apparatus of claim 27, further comprising at least one third mechanism configured to bring said at least one semiconductor component in contact with said exposed surface of viscous material.

51. The apparatus of claim 27, wherein said reservoir further comprises a circulation mechanism configured to circulate said viscous material and maintain uniformity of said viscous material.

52. The apparatus of claim 27, wherein said at least one second mechanism is attached to said reservoir.

53. The apparatus of claim 27, wherein said at least one semiconductor component comprises at least one lead finger of a lead frame.